Minerals components of Tasks EN-01 *Energy and Georesource Management* and SB-05 *Impact Assessment of Human Activities*

www.eo-miners.eu

Minerals in GEO
ImpactMin Final workshop

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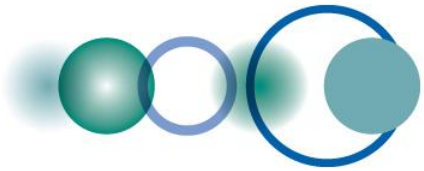
What is GEO?



An inter-governmental organisation established in 2004 in response to calls for action from the 2002 World Summit on Sustainable Development to develop & implement GEOSS

- 88 countries plus the EC are members and there are also 64 participating organisations (e.g. IUGS and EuroGeoSurveys)
- Oversight is by 3 Implementation Boards, an Executive Committee, Annual Plenary & periodic Ministerial Summits
- A 10 year implementation plan with bi-annual Work Plans, addressing 9 Societal Benefit Areas + 5 cross-cutting issues
- ~60 Tasks & Task Components taken on by members & participants: some best-endeavours; others funded e.g. by EC

What is GEOSS?

A Global Earth Observation System of Systems means:

- Focusing on users' needs
- Using what already exists
- Modifying it where needed
- Filling gaps where needed
- Better/new access systems
- Standards/interoperability
- Concerted capacity building

NOT a monolithic system owned or operated by one country

2015 Target: Global, coordinated, comprehensive, sustained system of observing systems, supporting informed decisions

Periodic Ministerial Summit & Annual Plenary

1st Summit in US in July 2003:

- Began the GEO process

2nd Summit in Japan in 2004:

- Framework Document

3rd Summit in Europe in 2005:

- 10 Year Implementation Plan

4th Summit in South Africa in 2007:

- Early implementation progress

5th Summit in China in 2010

- 10 year Plan mid-point review

6th Summit currently scheduled to be held in Switzerland in 2013

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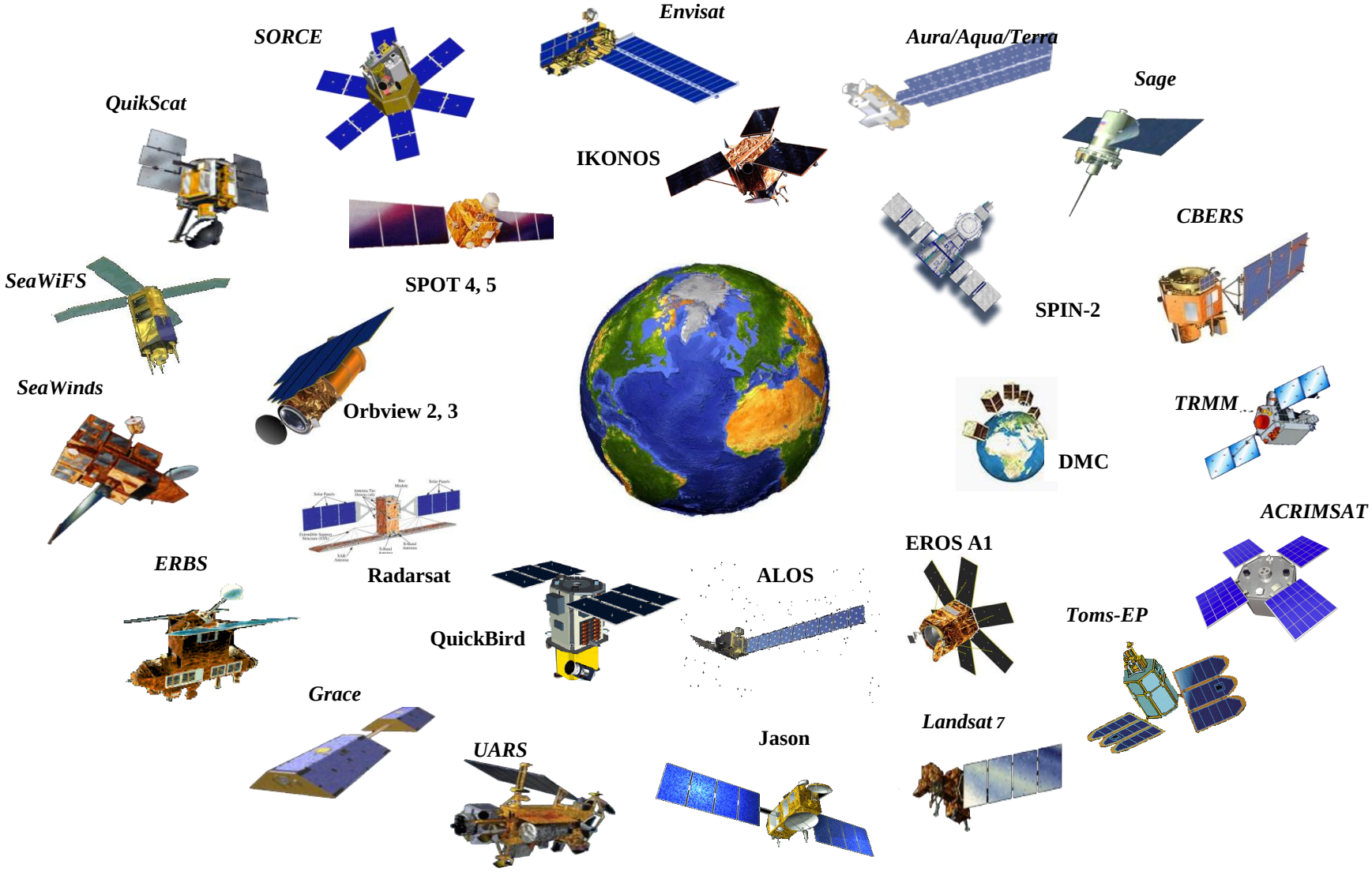
Global, coordinated, comprehensive, and sustained EO system making observations that address 9 Societal Benefit Areas

A Plethora of Spaceborne Observation Systems



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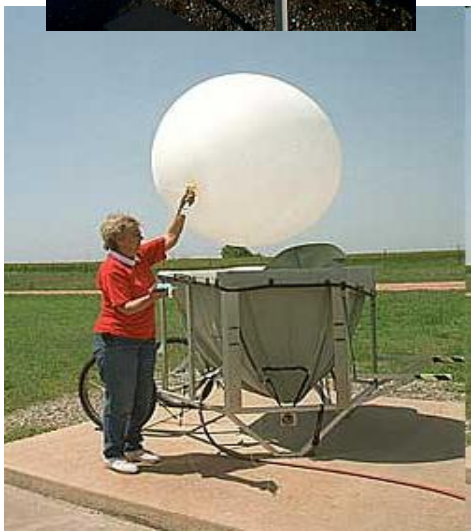
Diverse In-situ systems





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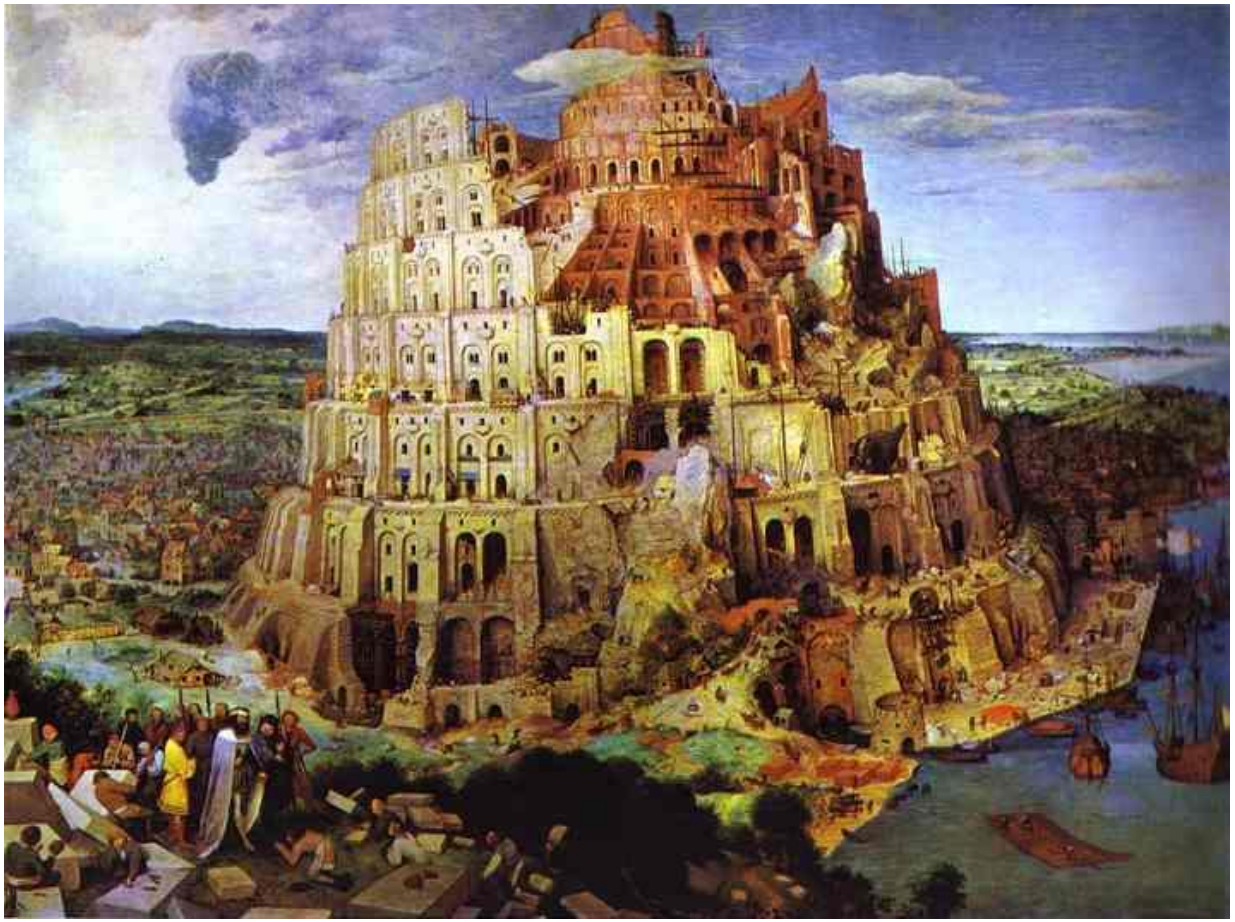
Tower of Babel problem…

Need for:

- Coordination
- Interoperable Architecture, data formats
- Data Sharing

… for society to benefit in full from all these EO Systems



GEOSS Implementation requires: Data Sharing and Interoperability

Full and Open Exchange of Data…

Recognizing Relevant International Instruments and National Policies and Legislation

... at Minimum Time delay and Minimum Cost

Free or Cost of Reproduction for Research and Education

Technical Specs for Collecting, Processing, Storing, and Disseminating Data and Products

Based on Non-proprietary Standards

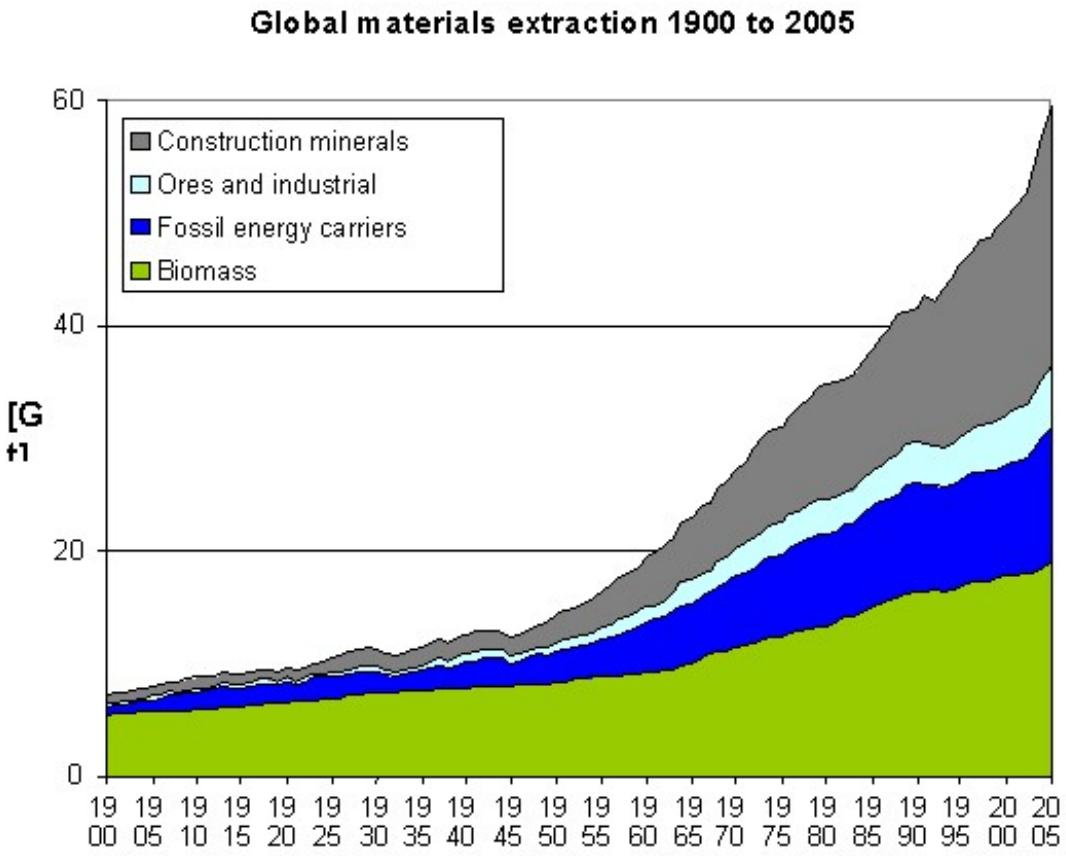
System Compliance for Contribution to GEOSS

Data available via GEO Portal/GEOSS Common Infrastructure

Why adressing minerals?

Economical importance of minerals

- Mining and extractive industry have played, and still play, a significant role in the development of many countries all over the world
- Mining, and the industries it supports, is among the basin building blocks of a modern society
- EU-25 non-energy extractive industry
  - direct turnover of about €40 billion
  - employment to about 250,000



Why adressing minerals?

Significant ecological footprint of mining

- 1 kg Gold requires 540 tons, a large share of which due to extraction
- Steel: 21 (One kilogram of steel carries an ecological rucksack of 21 kilograms.), Aluminum: 85, Gold: 540,000, Diamond: 53,000,000, Recycled Aluminum: 3.5, Rubber: 5

- The average ratio tonnage imported:tonnage mining waste changed from 1:4 to 1:16 in the past 25 years

Why adressing minerals?

EO in the Mineral Ressource Development Cycle

- EO in monitoring and assessment in each phase of the cycle
  - Spaceborne and airborne imagery
  - Ground and airborne geophysics
  - Geochemistry
  - In situ measurements
  - Monitoring networks
  - 3D modelling
  - …

Minerals in GEO?

EO-MINERS and GEO - GEOSS

- Securing the inclusion of minerals in GEO work plan 2012 – 2015 (with AEGOS)

- Two SBAs now adress minerals
  - EN-01: Energy and Geo-resources Management
  - SB-05: Impact Assessment of Human Activities

Scope of SB-05

- Foster the use of Earth observation and information for environmental, economic and societal impact assessment

- Develop datasets, tools and services for impact monitoring and prediction across Societal Benefit Areas. In particular, develop a set of tools to process and analyze datasets, either separately or in combination, including geophysical models

- Identify user-defined data requirements for impact monitoring and promote related in-situ as well as remotely-sensed observations.

3 Components

- C1: Tools and Information for Impact Assessement and Energy Policy Planning
  - Leads: EC FP7 (EnerGEO), Mines ParisTech (France), TNO (TNO emile.elewaut@tno.nl), IEEE
- **C2: Impact Monitoring System for Geo-Resource Exploration and Exploitation**
  - Leads: EC FP7 (EO-MINERS, ImpactMin), BRGM (France, s.chevrel@brgm.fr), DLR (Germany), BGS (UK), JPL (USA)
- C3: Operational Carbon Capture and Sequestration Monitoring System
  - Leads: NSC (Norway l-ingo-e@online.no), TNO (Netherlands), BGS & SciSys (UK)

Priority actions

- Develop new tools for impact monitoring of mining operations using Earth observations
- Integrate information from in-situ, airborne and satellite observation (through data assimilation) to provide impact diagnostics
- Identify and implement strategic measures for the competitive, reliable and sustainable management of geo-resources exploitation and treatment of re-usable materials, based on innovative monitoring and accounting methodologies (see also EN-01)
- Integrate often-sectoral monitoring approaches (and corresponding impact analysis) into a coherent approach, based on innovative Earth observation techniques (related to space-borne, airborne and ground-based sensor systems)

Resources currently available

EO-MINERS: Earth Observation for Monitoring and Observing Environmental and Societal Impacts of Mineral Resources Exploration and Exploitation

www.eo-miners.eu

s.chevrel@brgm.fr

Impact monitoring of mineral resources exploitation

www.impactmin.eu

coordinator@impactmin.eu

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SB-05-C2

Expected Achievements by 2015

- By July 2012 : GEO & Minerals workshop, Ljubljana, Slovenia, 4th–5th of July 2012

  - ➢ better addressing minerals in GEO
  - ➢ towards services in mineral exploration, impact assessment, mine site closure & reclamation

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COOPERATION

EO-MINERS

Earth Observation for Monitoring and Observing Environmental and Societal Impacts of Mineral Resources Exploration and Exploitation

1st announcement

Minerals & GEO

Minerals within Group on Earth Observation

W O R K S H O P

July 4 – 5, 2012, Ljubljana, Slovenia

- Integration of spaceborne, airborne and ground-based EO datasets into mature, stakeholder-oriented EO products
  - ➢ Integrated EO-based products and tools to monitor the societal and environmental impact of the extractive industry over all phases of a project, from exploration to closure

Recent Progress and Key Outputs for 2012

- Indicators for assessing and monitoring environmental and societal impact of extractive industry
- Qal/val for hyperspectral data acquisition and processing
- Mineral and vegetation mapping from VNIR – SWIR – TIR imaging spectroscopy
- Starting on-site trialogue (industry, regulators, local communities) activities

- **Task sheet for SB-05-C2 completed end of May 2012, with contribution from EO-MINERS and ImpactMin**

Recommendations / Ideas for Accelerating Work Plan Implementation

- Lobbying industry community and associations (EuroMines ETP-SMR…) for a better engagement in participative actions
  - ➢ Involve industry and industrialists in GEO – GEOSS?
  - ✓ Paper allowing for that was approved in 2012 Plenary

- Promote EO-based integrated tools in user oriented conferences and events (rather than in EO oriented events…)

  = tackling the right audience
- …
- …

Scope of EN-01

- Support development of Earth Observation products and services for energy and **geo-resources management**.
- Consider end-to-end energy production systems (including generation, transmission, distribution, and integrated operations) and **geo-resource exploitation systems** (including exploration, extraction and transportation).
- Promote collaboration between users and providers of Earth observation and information.
- Encourage the use of Earth observation and information for informed energy and **geo-resources policy planning** in developing and developed countries

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GEO Task EN-01

1 Component

C1:*Tools and Information for Resource Assessment, Monitoring & Forecasting of Energy Sources (including solar, wind, ocean, hydropower and biomass) and Geological Resources (including mineral & fossil resources, raw material, groundwater)*

- Leads : EC (FP7, GMES), France (BRGM, MINES ParisTech, thierry.ranchin@ensmp.fr), Germany (DLR), UK (BGS), CEOS, EuroGeoSurveys, IEEE, IRENA, IUGS

Resources currently available

- European FP7 projects ENDORSE (ENergy DOwnstReam SErvices - Providing energy components for GMES; 2011-2013); **AEGOS** Phase I legacy and Phase II, **EO-MINERS**
- German (DLR) Biomass model BETHY
- German “Presence Network”

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EN-01-C1

Priority actions

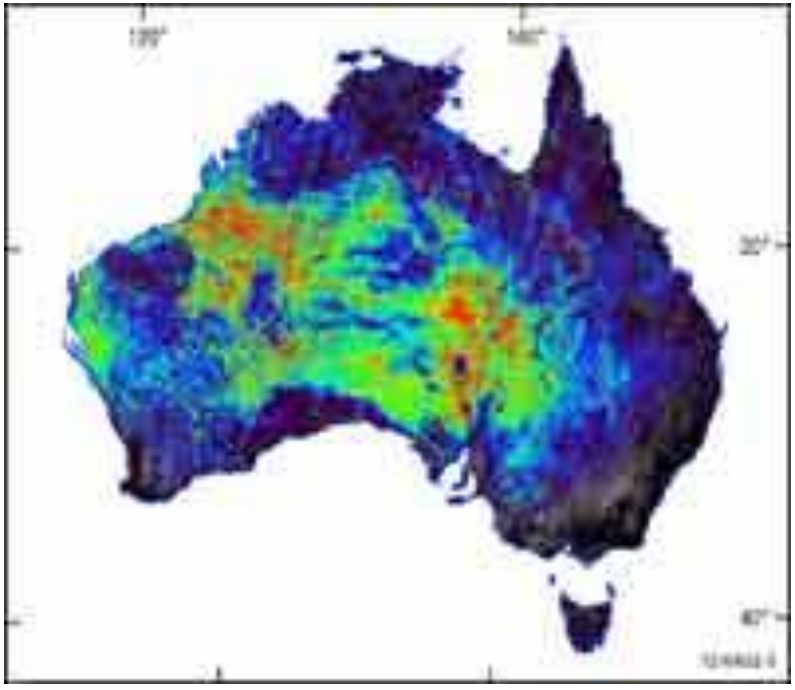
- Develop products and services required to assess countries' potential for energy production. Foster the use of Earth observation and information in energy-policy planning
- Identify user needs for specific energy data sets (including solar, wind, ocean, hydropower, andbiomass, geothermal)
- Develop a Bio-Energy Atlas for Africa to provide information on the quantity, distribution, usage, and quality of biomass. Provide Net Primary Production data and bio-energy potential prognosis maps at 1 km resolution from the year 2000 onwards. Derive assessments of vegetation-cover degradation or changes (see also SB-02, SB-03)
- Promote the use of Earth observations for **the mapping of geothermal resources**, with a focus on the East African Rift System (EARS). Locate geothermal anomalies using thermal and mineral mapping under different climate conditions (desert, savannah, rain forest)
- Develop and promote the use of integrated Earth observations for each stage of **the mineral life cycle** (exploration, extraction, transportation, waste disposal, mine remediation and aftercare) to provide the basis for informed decision-making and improved geo-resources management. Develop a sustainable "**trialogue**" between the mining industry, regulators and civil society
- Encourage training of decision-makers at all relevant levels for interpreting relevant data and products

Record from GEO Work Plan Symposium, Geneva April 30 – May 2, 2012

- **Data Management and Sharing**
  - Provide incentives to industry to provide, share and disseminate data on impact of their activity
- **Outreach/Communication**
  - Encourage industry communities and associations (e.g. EuroMines) to better engage in GEO activities

Global initiative and coverage adressing minerals

- Mineral map of Australia from ASTER imagery by CSIRO
- Mineral resource map of Afghanistan from ASTER and HyMap imagery by USGS



The PECOMINES project methodology